

Attendance Problems.

1. Find the midpoint between $(0, 2x)$ and $(2y, 2z)$.
 2. One leg of a right triangle has length 12, and the hypotenuse has length 13. What is the length of the other leg?
 3. Find the distance between $(0, a)$ and $(0, b)$, where $b > a$.
- I can position figures in the coordinate plane for use in coordinate proofs.
 - I can prove geometric concepts by using coordinate proof.

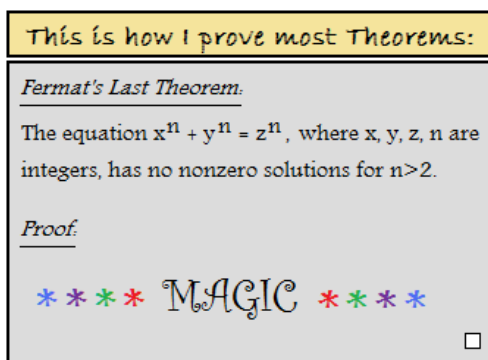
Common Core

CC.9-12.G.GPE.4 Use coordinates to prove simple geometric theorems algebraically.

4.8: CC.9-12.G.GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

4.8: CC.9-12.G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).

A **coordinate proof** is a style of proof that uses coordinate geometry and algebra. The first step of a coordinate proof is to position the given figure in the plane. You can use any position, but some strategies can make the steps of the proof simpler.



Strategies for Positioning Figures in the Coordinate Plane

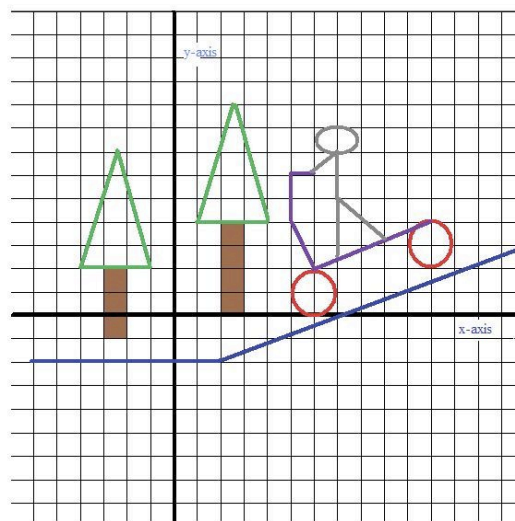
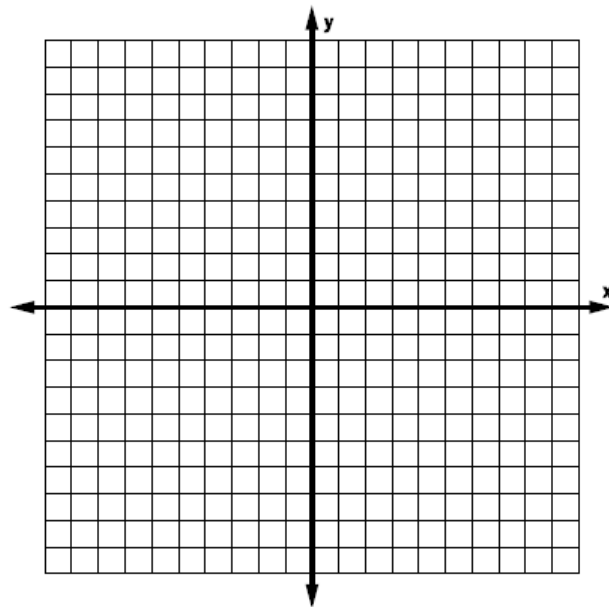
- Use the origin as a vertex, keeping the figure in Quadrant I.
- Center the figure at the origin.
- Center a side of the figure at the origin.
- Use one or both axes as sides of the figure.

Refer to example on page 279.

4. Guided Practice. Position a square with a side length of 6 units in the coordinate plane.

Once the figure is placed in the coordinate plane, you can use slope, the coordinates of the vertices, the Distance Formula, or the Midpoint Formula to prove statements about the figure.

Refer to example 2 on page 280.



Why did the math student get lost?

Because he used the wrong sign...
(traffic sign/math sign)

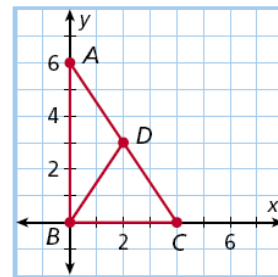
www.mathplane.com

5. Guided Practice.

Given: Right $\triangle ABC$ has vertices $A(0, 6)$, $B(0, 0)$, and $C(4, 0)$.

D is the midpoint of \overline{AC} .

Prove: The area of $\triangle ADB$ is one half the area of $\triangle ABC$.

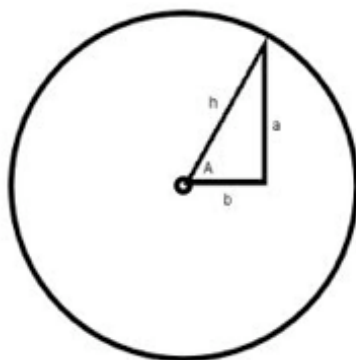


- A coordinate proof can also be used to prove that a certain relationship is always true.
- You can prove that a statement is true for all right triangles without knowing the side lengths.
- To do this, assign variables as the coordinates of the vertices.

Refer to example 3 on page 280.

Caution!

Do not use both axes when positioning a figure unless you know the figure has a right angle.



6. Guided Practice. Position a square with side length $4p$ in the coordinate plane and give the coordinates of each vertex.

If a coordinate proof requires calculations with fractions, choose coordinates that make the calculations simpler.

For example, use multiples of 2 when you are to find coordinates of a midpoint. Once you have assigned the coordinates of the vertices, the procedure for the proof is the same, except that your calculations will involve variables.

Remember!

Because the x - and y -axes intersect at right angles, they can be used to form the sides of a right triangle.

Refer to example 4 on page 281.

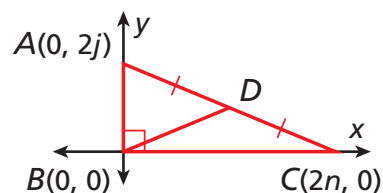
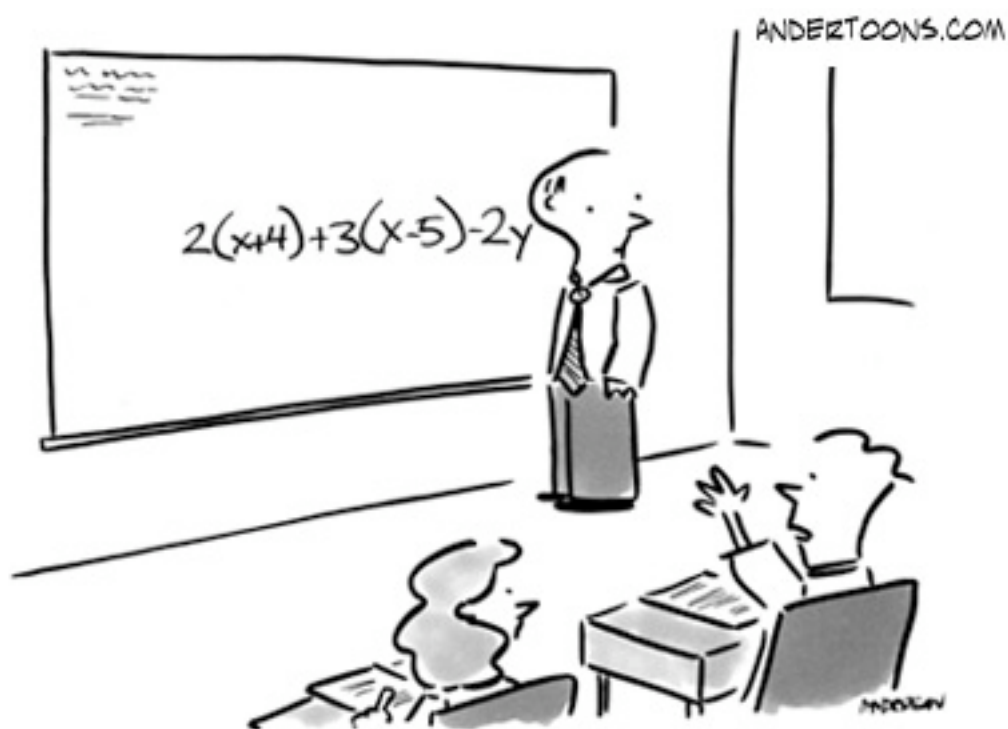


"We have Siri at school too, but we call it the intercom."

7. Guided Practice.

Given: $\angle B$ is a right angle in $\triangle ABC$.
D is the midpoint of \overline{AC} .

Prove: The area of $\triangle ADB$ is one half the area of $\triangle ABC$.

**4.8 Assignment** (pp 282-283) 8, 10, 12, 13, 15.

"How come we never complicate equations?"